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LA TIENDA
DRIVE,
WESTLAKE VILLAGE, CALIFORNIA 91361
ELECTRONIC SYSTEMS DIVISION
THE BUNKER-RAMO CORPORATION



TEL. #

COMPUTER DECISIONS

T NELSON SYS CNSLTNT

BOX 3
SCHOOLEYS MTN NJ 07870

COMPUTER APPLICATION

Bunker-Ramo will be pleased to provide you with specific hardware and software information pertinent to your application. To assist us in establishing your requirements, please fill out the information below:

A. TYPE OF APPLICATION

- ☐ Real Time Processing
- ☐ Guidance (Navigation)
- ☐ Control
- ☐ Other _____

B. PROCESSING ENVIRONMENT

- ☐ Aircraft
- ☐ Missile
- ☐ Satellite
- ☐ Ship
- ☐ Torpedo
- ☐ Vehicle
- ☐ Other (Specify) _____

C. QUANTITY REQUIRED

- ☐ 1 Unit
- ☐ 2—10 Units
- ☐ 11—50 Units
- ☐ 51—100 Units
- ☐ Over 100 (Specify) _____

D. • FIRST DELIVERY REQUIRED (after receipt of order)

- ☐ Less than 6 months
- ☐ 6—9 months
- ☐ 10—12 months
- ☐ More than 12 months

• WHAT IS APPROXIMATE ORDER
DATE? _____

E. DELIVERY RATE REQUIRED

- ☐ 1 per month
- ☐ 2—4 per month
- ☐ 4—8 per month
- ☐ 8—16 per month
- ☐ Other (Specify) _____

F. PRELIMINARY REQUIREMENTS

1 — Memory Size (words)

- ☐ 2K or less
- ☐ 4K
- ☐ 8K
- ☐ 16K
- ☐ Other (Specify) _____

(continued on reverse side)

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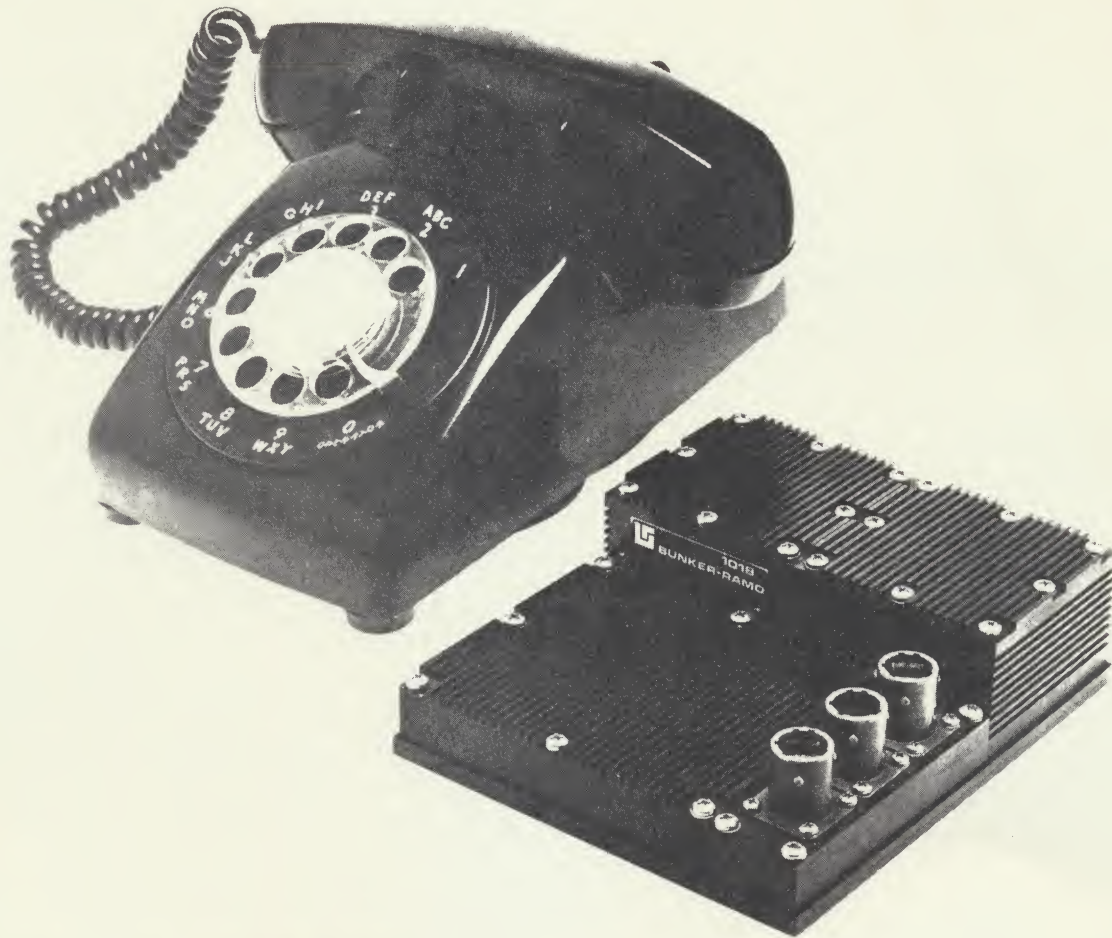
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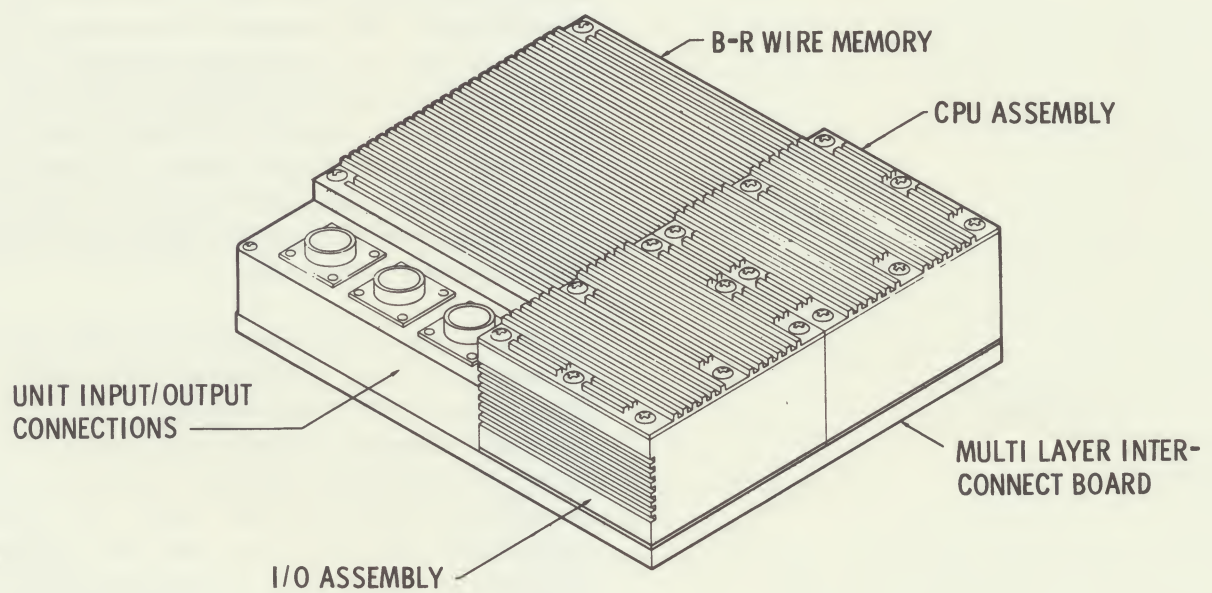
BR-1018 COMPUTER

 **THE BUNKER-RAMO CORPORATION**
ELECTRONIC SYSTEMS DIVISION

APPLICATIONS



B-R 1018 LAYOUT



TECHNOLOGY:

MOS/LSI
PLANAR COAX*

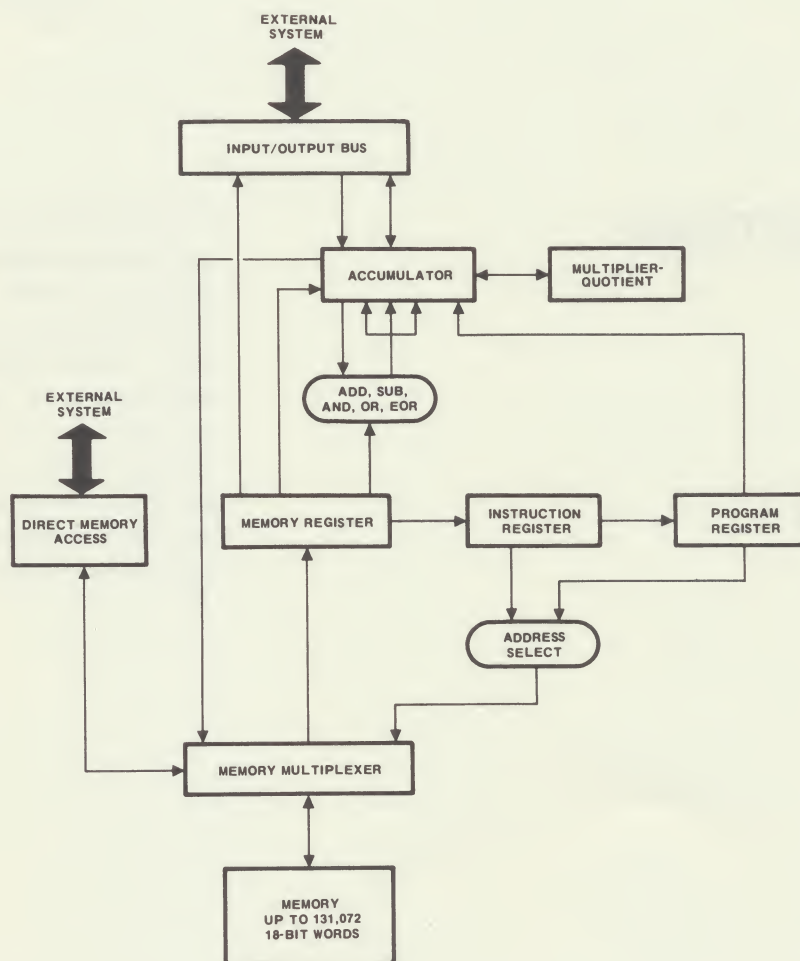
*A TRADEMARK OF THE BUNKER-RAMO CORPORATION

ORGANIZATION

The BR-1018 is an 18-bit parallel organized, single address machine, operating at a 1-MHz clock rate which yields an average short instruction time of 5 microseconds, average multiply and divide 33 and 43 microseconds, respectively. The address is defined by 13 of the 18 bits in a word, thus allowing direct addressing of the 8192 memory words. Since the address is explicitly defined in the instruction word, optimum memory utilization and speed of execution are achieved. Indirect addressing may be used for addressing up to 131,072 words of memory.

Three basic modules are used in the BR-1018 computer: Central Processing Unit (CPU), Input/Output (I/O), and Memory. The CPU has been designed so that it can operate with a variety of memory systems. This provides an area of flexibility that allows the most economical approach to be used for a given application. The types of memory systems utilized include plated wire, core, semiconductor, random-access memory (RAM), electrically alterable read-only memory (EAROM), and read-only memory (ROM). The basic system configuration contains a 4096 word plated wire (NDRO) memory. The CPU module contains all of the basic arithmetic and control functions. It operates with a basic set of 43 instructions. The I/O module contains all of the basic circuitry for a wide range of system interface requirements, while remaining flexible and uncomplicated. Data transfers between the computer and peripherals are accomplished over the I/O bus or via Direct Memory Access.

COMPUTER BLOCK DIAGRAM



INSTRUCTION REPERTOIRE

43 BASIC INSTRUCTIONS

ARITHMETIC

LOGICAL

TRANSFER

SKIP

BRANCH

INPUT/OUTPUT

15 ADDRESS TYPE

28 NO ADDRESS TYPE

SOFTWARE

The BR-1018 is supported with an extensive software package. In addition to the Assembler, Program Loader, I/O Monitor, and Confidence Test Program, a Simulation Program is available. Under the direction of simulation control cards input to the program, it will simulate all functions of the BR-1018 computer. A version of the assembler is available for both the IBM S/360 and BR-133 computers. The BR-1018 simulation program executes on an IBM S/360 computer.

BR-1018 SOFTWARE

- **ASSEMBLER**

Converts the mnemonic assembly language into object form

- **CONFIDENCE TEST PROGRAM**

Exercises the BR-1018 logic-detects and flags any erroneous logical operation.

- **SIMULATOR PROGRAM**

Checks out an assembled program for one BR-1018 computer on an EDP computer

- **UTILITY ROUTINES**

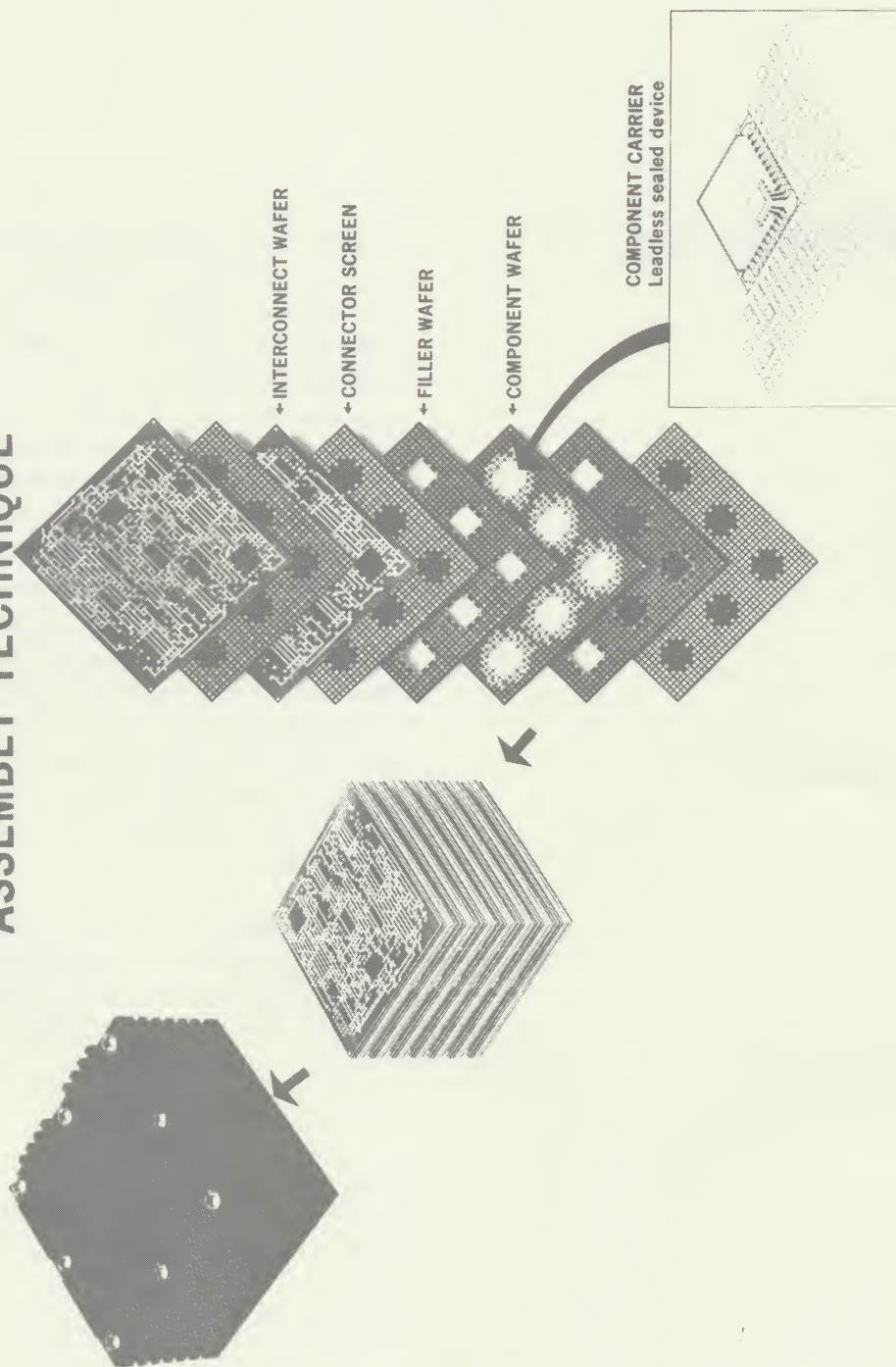
Program loader, I/O monitor

PLANAR COAX* PACKAGING

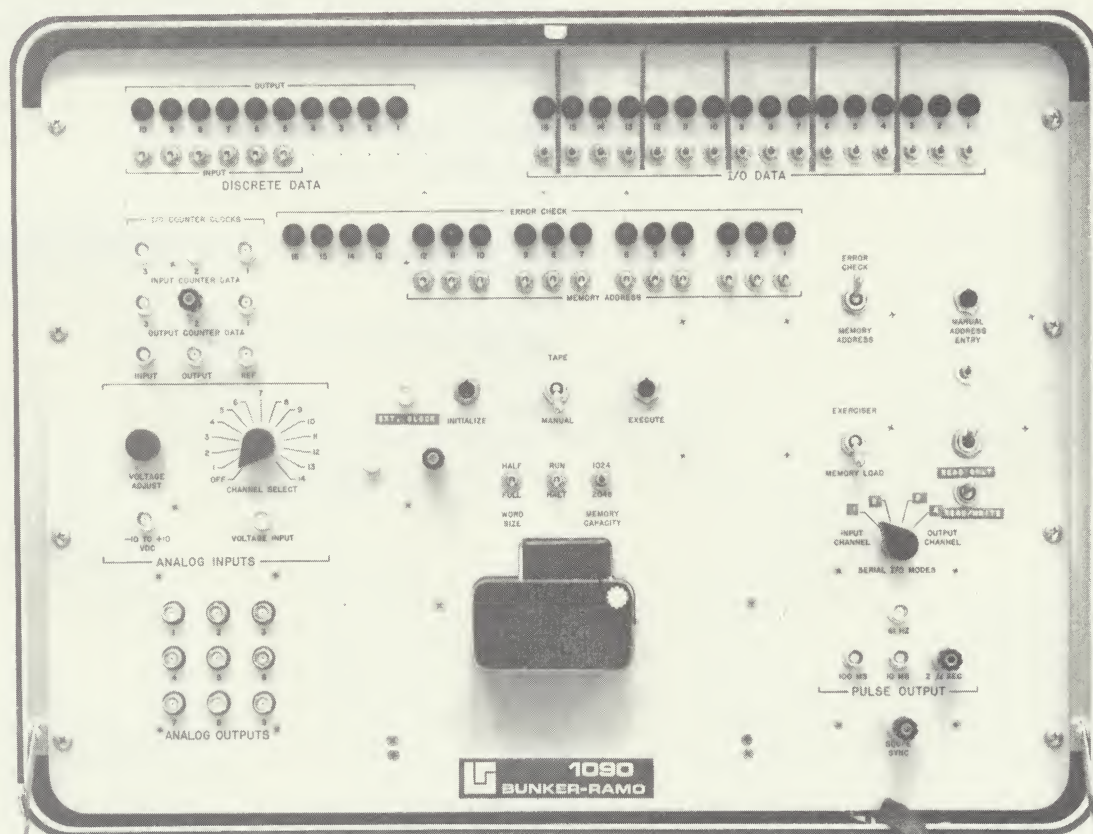
The BR-1018 computer is modularly constructed using Bunker-Ramo three dimensional PLANAR COAX* micropackaging. The CPU, I/O, and Memory Modules are mounted on a motherboard. The wafers which contain the LSI arrays and x-y-z plane interconnects are stacked to form the assembly sandwich for each module. All wafers are constructed of thin slices of beryllium copper and are batch fabricated. The LSI FBBs are contained in carriers which are soldered to the wafers in such a manner that three-dimensional coaxial interconnections are achieved. The end result is an assembly where all interconnections have an essentially constant impedance. The high heat removal capability and the lack of friction connectors provide an extremely reliable assembly.

*A TRADEMARK OF THE BUNKER-RAMO CORPORATION

BR-1018 ASSEMBLY TECHNIQUE



BR-1090



Maintenance and Test Console

RELIABILITY

The PLANAR COAX* micropackaging technique provides a computer with extremely high reliability. Components and connections are rigidly encased eliminating any flexing or stress from outside forces. Friction connections are completely eliminated and the impedance of all connections are essentially constant. Additional features of the PLANAR COAX* micropackaging which improves reliability are:

- Lower operating temperatures from better heat removal improves basic component reliability
- More uniform temperatures reduces circuit noise susceptibility
- Tighter control of geometry improves noise cancellation
- Inherent shielding reduces noise

The table on the adjacent page lists the results obtained from environmental tests on PLANAR COAX* packaged vehicles.

VEHICLE

- 24 columns of slugs and buttons with 3168 inter-connections total
Approximately 50% high-pressure contacts and
50% fused solder contacts

TESTS

- Vibration fatigue MIL-S-202 cond. D
20 G 10-2000 Hz 12 hrs.
- Temperature MIL-S-202-107B cond. B
-65⁰ c to +125⁰ c 5 cycles
- Impact MIL-S-202-213 cond. A
50 G 3 axis, 18 total
- Acceleration MIL-S-202-212 cond. A
100 G 30 min. total 3 axis
- Vibration fatigue MIL-S-750-2046
20 G 3 axis 60 Hz 96 hrs.
- Temperature shock MIL-E-5400
-54⁰ c to +71⁰c in 5 minutes
- Temperature soak
500 hrs. at -65⁰c
500 hrs. at +125⁰c

RESULTS

- No failures through above tests.



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